Gratitude

In appreciation and gratitude
to The Custodian of the Two Holy Mosques

King Abdullah Bin Abdul Aziz Al Saud

And

H.R.H. Prince Sultan Bin Abdul Aziz Al Saud

Crown Prince, Deputy Premier, Minister of Defence
& Aviation and Inspector General

For their continuous support and gracious consideration,
the Saudi Building Code National Committee (SBCNC)
is honored to present the first issue of
the Saudi Building Code (SBC).

Saudi Building Code Requirements

201	Architectural	
301	Structural – Loading and Forces	
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PREFACE

The Saudi Building Code (SBC) is a set of legal, administrative and technical regulations and requirements that specify the minimum standards of construction for building in order to ensure public safety and health. A Royal Decree dated 11th June 2000 order the formation of a national committee composed of representatives of Saudi universities and governmental and private sectors. In September 2001, the Council of Ministers approved the general plan of the National Committee to develop a national building code for the Kingdom of Saudi Arabia.

To choose a base code for the Saudi Building Code, a number of Codes have been studied. The National Committee has been acquainted with the results of the national researches and the international codes from the U.S.A., Canada and Australia, also, the European Code, and Arab Codes. It has also sought the opinions of specialists in relevant Saudi universities, governmental and private sectors through holding a questionnaire, a symposium and specialized workshops, in the light of which, (ICC) has been chosen to be a base code for the Saudi Building Code.

The International Code Council (ICC) grants permission to the Saudi Building Code National Committee (SBCNC) to include all or any portion of material from the ICC codes, and standards in the SBC and ICC is not responsible or liable in any way to SBCNC or to any other party or entity for any modifications or changes that SBCNC makes to such documents.

Toward expanding the participation of all the specialists in the building and construction industry in the Kingdom through the governmental and private sectors, the universities and research centers, the National Committee took its own decisions related to code content by holding specialized meetings, symposiums and workshops and by the help of experts from inside and outside of Saudi Arabia.

The technical committees and sub-committees started their work in April 2003 to develop the Saudi Building Code that adapts the base code with the social and cultural environment, the natural and climatic conditions, types of soil and properties of materials in the Kingdom

The Saudi Building Code Structural Requirements for Testing and Inspection (SBC 302) were developed based on ICC code in addition to American Concrete Institute (ACI) materials. ACI grants permission to the SBCNC to include ACI materials in the SBC, and ACI is not responsible for any modifications or changes that SBCNC has made to accommodate local conditions.

The development process of SBC 302 followed the methodology approved by the Saudi Building Code National Committee. Many changes and modifications were implemented. These changes range from replacing sections with new ones, inserting additional sections such as precast concrete constructions, and special inspections for wind requirements, removing irrelevant topics such as wood construction, and wall panels and veneers.

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** Partially.

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CHAPTER 1
GENERAL

SECTION 1.1
SCOPE

1.1.0 The Saudi Building Code for Structural Tests and Inspections referred to as SBC 302, provides minimum requirements for Structural Tests and Inspections. SBC 302 shall govern the quality, workmanship and requirements for:

1. Approval procedures of inspection agencies, fabricators and others required in SBC 302,
2. Special inspection of the materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards,
3. Seismic and wind resistant constructions,
4. New building materials or method of construction not provided for in the SBC.

Materials of construction and tests shall conform to the applicable standards listed in SBC 301 through SBC 306.

SECTION 1.2
DEFINITIONS

1.2.0 The following words and terms shall, for the purposes of this code and as used elsewhere in the SBC, have the meanings shown herein.

Approved agency. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.

Approved fabricator. An established and qualified person, firm or corporation approved by the building official pursuant to this code.

Certificate of compliance. A certificate stating that materials and products meet specified standards or that work was done in compliance with approved construction documents.

Fabricated item. Structural, load-bearing or lateral load-resisting assemblies consisting of materials assembled prior to installation in a building or structure, or subjected to operations such as heat treatment, thermal cutting, cold working or reforming after manufacture and prior to installation in a building or structure. Materials produced in accordance with standard specifications referenced by this code, such as rolled structural steel shapes, steel-reinforcing bars, masonry units and plywood sheets, shall not be considered "fabricated items."

Inspection certificate. An identification applied on a product by an approved agency containing the name of the manufacturer, the function and performance characteristics, and the name and identification of an approved agency that

indicates that the product or material has been inspected and evaluated by an approved agency (see 1.5.5 and “Label”, “Manufacturer’s designation” and “Mark”).

Label. An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an approved agency and that indicates that the representative sample of the product or material has been tested and evaluated by an approved agency (see 1.5.5 and “Inspection certificate”, “Manufacturer’s designation” and “Mark”).

Manufacturer’s designation. An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules (see also “Inspection certificate”, “Label” and “Mark”).

Mark. An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material (see also “Inspection certificate,” “Label” and “Manufacturer’s designation”).

Special conditions not covered by the structural code. New building materials, equipment, appliances, systems or methods of construction not covered by the SBC, and any material of questioned suitability proposed for use in the construction of a building or structure.

Special inspection. Inspection as herein required of the materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards. The special inspections shall be carried out by certified special inspectors or approved agencies.

Special inspection, continuous. The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

Special inspection, periodic. The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

Sprayed fire-resistant materials. Cementitious or fibrous materials that are spray applied to provide fire-resistant protection of the substrates.

SECTION 1.3
INSPECTIONS

1.3.1 **General.** Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the

permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the building official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

1.3.2 **Preliminary inspection.** Before issuing a permit, the building official is authorized to examine or cause to be examined buildings, structures, sites and approved drawings and specifications for which an application has been filed.

1.3.3 **Required inspections.** The building official, upon notification, shall make the inspections set forth in Sections 1.3.3.1 through 1.3.3.6.

1.3.3.1 **Footing and foundation inspection.** Footing and foundation inspections shall be made after excavations for the foundations are complete and any required reinforcing steel is in place. Inspection shall include shoring of adjacent building structures, dewatering, and compaction if required. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with ASTM C 94, the concrete need not be on the job.

1.3.3.2 **Concrete slab and under-floor inspection.** Concrete slab and under-floor inspections shall be made after in-slab or under-floor reinforcing steel and building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the sub floor.

1.3.3.3 **Fire-resistant penetrations.** Protection of joints and penetrations in fire-resistance-rated assemblies shall not be concealed from view until inspected and approved.

1.3.3.4 **Energy efficiency inspections.** Inspections shall be made to determine compliance with SBC 601 and shall include, but not be limited to, inspections for: envelope insulation *R* and *U* values, fenestration *U* value, duct system *R* value, and HVAC and water-heating equipment efficiency.

1.3.3.5 **Special inspections.** For special inspections, see Chapter 2.

1.3.3.6 **Final inspection.** The final inspection shall be made after all work required by the building permit is completed.

1.3.4 **Inspection agencies.** The building official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

1.3.5 **Inspection requests.** It shall be the duty of the holder of the building permit or their duly authorized agent to notify the building official when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

1.3.6 **Approval required.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official. The building official, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the building official.

SECTION 1.4
ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

1.4.1 **General.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

1.4.1.1 **Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

1.4.1.2 **Tests.** Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the building official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the building official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the building official for the period required for retention of public records.

SECTION 1.5
APPROVALS

1.5.1 **Approved agency.** An approved agency shall provide all information as necessary for the building official to determine that the agency meets the applicable requirements.

1.5.1.1 **Independent.** An approved agency shall be objective and competent. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed.

1.5.1.2 **Equipment.** An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

1.5.1.3 **Personnel.** An approved agency shall employ (experienced professional engineers and qualified technicians) educated in conducting, supervising and evaluating tests and/or inspections.

1.5.2 **Written approval.** Any material, appliance, equipment, system or method of construction meeting the requirements of SBC shall be approved in writing after satisfactory completion of the required tests and submission of required test reports.

1.5.3 **Approved record.** For any material, appliance, equipment, system or method of construction that has been approved, a record of such approval, including the conditions and limitations of the approval, shall be kept on file in the building

official's office and shall be open to public inspection at appropriate times.

1.5.4 **Performance.** Specific information consisting of test reports conducted by an approved testing agency in accordance with standards sited in the Saudi Building Code, or other such information as necessary, shall be provided for the building official to determine that the material meets the applicable code requirements.

1.5.4.1 **Research and investigation.** Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the building official shall approve the use of the material or assembly subject to the requirements of SBC. The cost offsets, reports and investigations required under these provisions shall be paid by the permit applicant.

1.5.4.2 **Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in SBC, shall consist of valid research reports from approved sources.

1.5.5 **Labeling.** Where materials or assemblies are required by SBC to be labeled, such materials and assemblies shall be labeled by an approved agency in accordance with 1.5.1. Products and materials required to be labeled shall be labeled in accordance with the procedures set forth in Sections 1.5.5.1 through 1.5.5.3.

1.5.5.1 **Testing.** An approved agency shall test a representative sample of the product or material being labeled to the relevant standard or standards. The approved agency shall maintain a record of the tests performed. The record shall provide sufficient details to verify compliance with the test standard.

1.5.5.2 **Inspection and identification.** The approved agency shall periodically perform an inspection, which shall be in-plant if necessary, of the product or material that is to be labeled. The inspection shall verify that the labeled product or material is representative of the product or material tested.

1.5.5.3 **Label information.** The label shall contain the manufacturer's or distributor's identification, model number, serial number or definitive information describing the product or material's performance characteristics and approved agency's identification.

1.5.6 **Evaluation and follow-up inspection services.** Where structural components or other items regulated by SBC are not visible for inspection after completion of a prefabricated assembly, the permit applicant shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the building official to determine conformance to SBC. Such a report shall be approved by the building official.

1.5.6.1 **Follow-up inspection.** The permit applicant shall provide for special inspections of fabricated items in accordance with Section 2.2.

1.5.6.2 **Test and inspection records.** Records of test and special inspection shall be preserved by the special inspector (inspection agency) for 5 years after completion of the project. Copies of necessary test and inspection records shall be filed with the building official.

CHAPTER 2
SPECIAL INSPECTIONS

SECTION 2.1
GENERAL

2.1.0 Where application is made for construction as described in this chapter, the owner or the registered design professional in responsible charge acting as the owner's agent shall employ one or more special inspectors to provide inspections during construction on the types of work listed under Chapter 2. The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the building official, for inspection of the particular type of construction or operation requiring special inspection. These inspections are in addition to the inspections specified in Section 1.3.

Exceptions:

1. Special inspections are not required for work of a minor nature as approved by the building official.
2. Unless otherwise required by the building official, special inspections are not required for occupancies in Group R-3 and occupancies in Group U that are accessory to a residential occupancy including, but not limited to, those listed in SBC 201.

2.1.1 **Building permit requirement.** The permit applicant shall submit a statement of special inspections prepared by the registered design professional in responsible charge in accordance with construction documents and other related provisions, as a condition for permit issuance. This statement shall include a complete list of materials and work requiring special inspections by this chapter, the inspections to be performed and a list of the individuals, approved agencies or firms intended to be retained for conducting such inspections.

2.1.2 **Report requirement.** Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted no later than 3 months of the completion of the work.

SECTION 2.2
INSPECTION OF FABRICATORS

2.2.0 Where fabrication of structural load-bearing members and assemblies is being performed on the premises of a fabricator's shop, special inspection of the fabricated items shall be required by this chapter and as required elsewhere in SBC.

2.2.1 **Fabrication and implementation procedures.** The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures that

provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.

Exception: Special inspections as required by Section 2.2 shall not be required where the fabricator is approved in accordance with Section 2.2.2.

2.2.2 **Fabricator approval.** Special inspections required by this code are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction documents.

SECTION 2.3
STEEL CONSTRUCTION

2.3.0 The special inspections for steel elements of buildings and structures shall be as required by this section and Table 2.3.

Exceptions:

1. Special inspection of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, grade and mill test reports for the main stress-carrying elements are capable of being determined.
2. The special inspector need not be continuously present during welding of the following items, provided the materials, welding procedures and qualifications of welders are verified prior to the start of the work; periodic inspections are made of the work in progress and a visual inspection of all welds is made prior to completion or prior to shipment of shop welding.
   a. Single-pass fillet welds not exceeding 8 mm in size.
   b. Floor and roof deck welding.
   c. Welded studs when used for structural diaphragm.
   d. Welded sheet steel for cold-formed steel framing members such as studs and joists.
   e. Welding of stairs and railing systems.

2.3.1 **Welding.** Welding inspection shall be in compliance with AWS D1.1. The basis for welding inspector qualification shall be AWS D1.1.

2.3.2 **Details.** The special inspector shall perform an inspection of the steel frame to verify compliance with the details shown on the approved construction documents, such as bracing, stiffening, member locations and proper application of joint details at each connection.

2.3.3 **High-strength bolts.** Installation of high-strength bolts shall be periodically inspected in accordance with AISC specifications.

2.3.3.1 **General.** While the work is in progress, the special inspector shall determine that the requirements for bolts, nuts, washers and paint; bolted parts and installation and tightening in such standards are met. For bolts requiring pretensioning, the special inspector shall observe the pre-installation testing and calibration procedures when such procedures are required by the installation method or by project plans or specifications; determine that all plies of connected materials have been drawn together and properly snugged and monitor the installation of bolts to verify that the selected procedure for installation is properly used to tighten bolts. For joints required to be tightened only to the snug-tight condition, the special inspector need only verify that the connected materials have been drawn together and properly snugged.

2.3.3.2 **Periodic monitoring.** Monitoring of bolt installation for pretensioning is permitted to be performed on a periodic basis when using the turn-of-nut method with match marking techniques, the direct tension indicator method or the alternate design fastener (twist-off bolt) method. Joints designated as snug tight need be inspected only on a periodic basis.

2.3.3.3 **Continuous monitoring.** Monitoring of bolt installation for pretensioning using the calibrated wrench method or the turn-of-nut method without match marking shall be performed on a continuous basis.

TABLE 2.3
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS during task listed	PERIODIC during task listed	REFERENCE STANDARD
1. Material verification of high-strength bolts, nuts and washers:			
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	—	X	Applicable ASTM material specifications; AISC 335, Section A3.4; SBC 306, Section 1.3.3
b. Manufacturer's certificate of compliance required.	—	X	
2. Inspection of high-strength bolting.			
a. Bearing-type connections.	—	X	SBC 306, Section 13.2.5& SBC 302 (2.3.3)
b. Slip-critical connections.	X		
3. Material verification of structural steel:			
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	—	X	ASTM A 6 or ASTM A 568 & SBC 302 (3.3.4)
b. Manufacturers' certified mill test reports.	—	X	ASTM A 6 or ASTM A 568
4. Material verification of weld filler materials:			
a. Identification markings to conform to AWS specification in the approved construction documents.	—	X	AISC ASD, Section A3.6; SBC 306, Section 1.3.5
b. Manufacturer's certificate of compliance required.	—	X	
5. Inspection of welding:			
a. Structural steel:			
1) Complete and partial penetration groove welds	X	—	
2) Multipass fillet welds.	X	—	AWS D1.1 & SBC 302 (2.3.1)
3) Single-pass fillet welds > 8 mm	X	—	
4) Single-pass fillet welds ≤ 8 mm	—	X	
5) Floor and deck welds.	—	X	AWS D1.3
6. Inspection of steel frame joint details for compliance with approved construction documents:			
a. Details such as bracing and stiffening.	—	—	
b. Member locations.	—	—	SBC 302 (2.3.2)
c. Application of joint details at each connection.	—	—	

SECTION 2.4
CONCRETE CONSTRUCTION

2.4.0 **Concrete construction.** The special inspections and verifications for concrete construction for compliance with approved design drawings and with SBC requirements shall be as required by this section and Table 2.4.

Exception: Special inspections shall not be required for minor constructions such as fence walls, driveways and nonstructural concrete elements.

2.4.1 **Materials.** In the absence of sufficient data or documentation providing evidence of conformance to quality standards for materials, the building official shall require testing of materials in accordance with the appropriate standards and criteria for the material in Section 3.0 SBC 304.

TABLE 2.4
REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS during task listed	PERIODIC during task listed	REFERENCE STANDARD
1. Inspection of structural layout and members dimensions for compliance with approved design drawings and construction tolerances	–	X	–
2. Inspection of reinforcing steel, including prestressing tendons, and placement.		X	SBC 304 (3.5, 7.1-7.7)
3. Inspection of formwork		X	SBC 304 (6.1-6.2)
4. Inspection of concrete mix a. Verify the use of required design mix b. Verify that the delivery is from certified batch plant		 X X	SBC 304 (4, 5.2-5.4)
5. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and determine the temperature of the concrete.	X		ASTM C 172 ASTM C 31 SBC 304 (5.6, 5.8)
6. Inspection of concrete placement for proper application techniques.	X		SBC 304 (5.9, 5.10)
7. Inspection of curing techniques and hot weather requirements.		X	SBC 304 (5.11-5.13)
8. Inspection of prestressed concrete: a. Application of prestressing forces. b. Grouting of bonded prestressing tendons in the seismic-force-resisting system.	 X X		 SBC 304 (18.20) SBC 304 (18.18.4)
9. Verification of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.		X	SBC 304 (6.2)

SECTION 2.5
PRECAST CONCRETE CONSTRUCTION

2.5.0 The special inspections and verifications for the precast concrete elements for compliance with the approved design drawings, shop drawings, the approved manufacturer procedure and SBC requirements shall be as required by this section and Table 2.5.

Exception: Special inspection shall not be required for non-structural precast elements such as curb stones, and pavers.

TABLE 2.5
REQUIRED VERIFICATION AND INSPECTION OF PRECAST CONCRETE CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS during task listed	PERIODIC during task listed	REFERENCE STANDARD
1. Shop drawings shall be reviewed for compliances with the contract specifications and drawings prior to fabrication.		X	
2. Form work, rebar, location of lifting hooks and embedded items including pre-stressed tendons and post tension duct.		X	SBC 304 (3.5, 7.1-7.7, 16.7)
3. Concrete mix design approval and verify the use of the approved concrete mix.		X	SBC 304 (4, 5.2-5.4)
4.			
a. Conveying and placing concrete techniques.		X	SBC 304 (5.9 & 5.10)
b. Samples of the concrete to determine slump test, temperature, air and the strength of the mix.		X	ACI 301, Section 1.6.4.2.d, e, f & g
5. Precast with pretension			
a. Verification of tendons for prestressed reinforcement.		X	SBC 304 (3.5)
b. Verification tensile stresses in the tendons and measurement of tendon elongation.		X	SBC 304 (18.18)
c. Verification of anchorage end blocks strength to support prestressing forces.		X	SBC 304 (18.13.2)
6. Curing techniques including curing by high pressure steam to accelerate strength gain and reduce time of curing.		X	SBC 304 (5.11 & 5.13)
7. Finishing		X	ACI 301 Section 5.3.3 & 5.3.4
8. Precast with post-tension			
a. Verification of the concrete strength before the post tension takes place.		X	
b. Verification of ducts and end anchorage materials.		X	ACI 301, Section 9.2
c. Verification of the profile of ducts in the member as per design drawings.		X	SBC 304 (18.15)
d. Verification of prestressing force and measurement of tendon elongation.		X	SBC 304 (18.18)
e. Grouting of ducts.		X	SBC 304 (18.16)
f. Verification of anchorage and couplers.		X	SBC 304 (18.19)
9. Transportation			
a. Verification of precast elements transported position consistent with their shape and design to avoid excessive handling stress.		X	SBC 304 (16.6)
b. Verification of concrete strength before transportation. Member should have attained 85% of the concrete compressive strength.		X	SBC 304 (16.6)
10. Storage and handling at the job site.		X	SBC 304 (16.9)
11. Lifting and erection of the elements.		X	
12. Connection type and technique. Refer to Table 2.3	X		SBC 306, AWS (D1.1), ASTM A 325, ASTM A490,H-strength, ASTM A 307 Regular

SECTION 2.6
MASONRY CONSTRUCTION

2.6.0 The special inspection and verifications for masonry construction shall be as required by this section and table 2.6.

Exception: Special inspections shall not be required for minor construction such as fence walls.

TABLE 2.6
REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION

VERIFICATION AND INSPECTION	Continuous during task listed	Periodic during task listed	REFERENCE STANDARD	
			SBC 305	ACI 530.1/ASCE 6/TMS 602
1-As masonry construction begins, the following shall be verified to ensure compliance with the approved submittals				
a. Certificate for materials used in masonry construction including but not limited Masonry units, Mortar and grout material, Anchors, ties, fasteners, and metal accessories, Reinforcement.	–	X	3.	Art. 1.5
b. Proportions of site-prepared mortar.	–	X	–	Art. 2.6A
2-The inspection program shall verify compliance with construction documents and code provisions.				
a. Size, location, and alignment of structural elements and construction.	–	X	–	Art. 3.3G
b. Placement of masonry units and mortar.	–	X	4.1.2	Art 3.3
c. Placement of reinforcement, tie and anchor.	–	X	4.8	Art. 3.4
d. Protection of masonry during cold weather or hot weather.	–	X	4.3, 4.4	Art.1.8C, 1.8D
3-Prior to grouting, the following shall be verified to ensure compliance with code.				
a. Grout space is clean.	–	X	–	Art. 3.2D
b. Placement of reinforcement and connectors.	–	X	–	Art. 3.4
c. Proportions of site-prepared grout.	–	X	–	Art. 2.6B
4-Grout placement shall be verified to ensure compliance with code.		X	–	Art 3.5
5-Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.		X	5.2.2, 5.3	Art. 1.4

SECTION 2.7
SOIL AND FOUNDATIONS

2.7.0 The special inspections for existing site soil conditions, fill placement and load-bearing requirements shall be as required by this section and Table 2.7. The approved soils report, required by Section 2.2 SBC 303, shall be used to determine compliance.

TABLE 2.7
REQUIRED VERIFICATION AND INSPECTION OF SOIL AND FOUNDATIONS

VERIFICATION AND INSPECTION	Continuous during task listed	Periodic during task listed	REFERENCE STANDARD	
			SBC 303	ASTM
1. Geotechnical Investigation			Chapter 2	D-420
a. Particle Size Analysis of Soils		X		D-422, D-1140
b. Liquid Limit, Plastic Limit		X		D4318
c. Standard Penetration Test		X		D-1586
d. Soil Classification		X		D-2487
2. Earthwork			Chapter 3	
a. Excavation		X		
b. Backfill - Compaction				
b.1 Moisture Density Relations	X			D-698, D-1557
b.2 Density by Nuclear Methods	X			D-2922
c. Drainage		X	Chapter 13	
3. Dewatering		X	Chapter 13	
4. Bearing Capacity			Chapter 4	
a. Plate Load Test		X		D-1194
b. Field Vane Test in Cohesive Soils	X			D-2573
c. Direct Shear Strength	X			D-3080
5. Footings and Foundations		X	Chapters 5, 6, 8, 9, 10, 11, 12	
6. Retaining Walls		X	Chapter 7	
7. Damp proofing & Waterproofing		X	Chapter 13	
8. Pier & Pile Foundations			Chapter 14	
a. Friction Cone Penetration Test	X			D-3441
b. (Testing) Pile under Axial Load	X			D-1143
9. Expansive & Collapsible Soils		X	Chapter 2	
10. Sabkha Soils		X	SBC 302 (2.7.5)	
11. Random & Artificial Backfill		X	SBC 302 (2.7.4)	

2.7.1 **Site preparation**. Prior to placement of the prepared fill, the special inspector shall determine that the site has been prepared in accordance with the approved soils report.

2.7.2 **During fill placement**. During placement and compaction of the fill material, the special inspector shall determine that the material being used and the maximum lift thickness comply with the approved report, as specified in Section 3.10 SBC 303.

2.7.3 **Evaluation of in-place density.** The special inspector shall determine, at the approved frequency, that the in-place dry density of the compacted fill complies with the approved report.

2.7.4 **Special conditions.** Random backfill or artificial backfill when encountered in reclaimed land (along shorelines, wadi slopes, etc.) shall be treated with utmost care, to make sure that soil conditions are satisfactory, otherwise soil improvement techniques should be used to avoid future structural damage.

2.7.5 **Sabkha soils.** Building foundations built over Sabkha soils, encountered in many locations in the Kingdom of Saudi Arabia, should be protected. Special precaution shall be taken regarding the control of humidity in the ground. Replacement of Sabkha soils shall be considered where possible.

2.7.6 **Pile foundations.** A special inspector shall be present when pile foundations are being installed and during tests. The special inspector shall make and submit to the building official records of installation of each pile and results of load tests.

Records shall include the cutoff and tip elevation of each pile relative to a permanent reference.

2.7.7 **Pier foundations.** Special inspection is required for pier foundations for buildings assigned to Seismic Design Category C or D.

SECTION 2.8
SPRAYED FIRE-RESISTANT MATERIALS

2.8.0 Special inspections for sprayed fire-resistant materials applied to structural elements and decks shall be in accordance with Section 2.8.1 through 2.8.5. Special inspections shall be based on the fire-resistance design as designated in the approved construction documents.

2.8.1 **Structural member surface conditions.** The surfaces shall be prepared in accordance with the approved fire-resistance design and the approved manufacturer's written instructions. The prepared surface of structural members to be sprayed shall be inspected before the application of the sprayed fire-resistant material.

2.8.2 **Application.** The substrate shall have a minimum ambient temperature before and after application as specified in the approved manufacturer's written instructions. The area for application shall be ventilated during and after application as required by the approved manufacturer's written instructions.

2.8.3 **Thickness.** The average thickness of the sprayed fire-resistant materials applied to structural elements shall not be less than the thickness required by the approved fire-resistant design. Thickness shall be determined in accordance with ASTM E 605. Samples of the sprayed fire-resistant materials shall be selected in accordance with Section 2.8.3.1 and 2.8.3.2.

2.8.3.1 **Floor, roof and wall assemblies.** The thickness of the sprayed fire-resistant material applied to floor, roof and wall assemblies shall be determined in accordance with ASTM E 605, taking the average of not less than four measurements for each 100 m^2 of the sprayed area on each floor or part thereof.

2.8.3.2 **Structural framing members.** The thickness of the sprayed fire-resistant material applied to structural members shall be determined in accordance with ASTM E 605. Thickness testing shall be performed on not less than 25 percent of the structural members on each floor.

2.8.4 **Density.** The density of the sprayed fire-resistant material shall not be less than the density specified in the approved fire-resistant design. Density of the sprayed fire-resistant material shall be determined in accordance with ASTM E 605.

2.8.5 **Bond strength.** The cohesive/adhesive bond strength of the cured sprayed fire-resistant material applied to structural elements shall not be less than 7 kN/m^2. The cohesive/adhesive bond strength shall be determined in accordance with the field test specified in ASTM E 736 by testing in-place samples of the sprayed fire-resistant material selected in accordance with 2.8.5.1 and 2.8.5.2.

2.8.5.1 **Floor, roof and wall assemblies.** The test samples for determining the cohesive/ adhesive bond strength of the sprayed fire-resistant materials shall be selected from each floor, roof and wall assembly at the rate of not less than one sample for

every 1000 m^2 or part thereof of the sprayed area in each story.

2.8.5.2 **Structural framing members.** The test samples for determining the cohesive/ adhesive bond strength of the sprayed fire-resistant materials shall be selected from beams, girders, joists, trusses and columns at the rate of not less than one sample for each type of structural framing member for each 1000 m^2 of floor area or part thereof in each story.

CHAPTER 3
SEISMIC AND WIND RESISTANT CONSTRUCTIONS

SECTION 3.1
SCOPE

The provisions of this chapter apply to Quality assurance, Special inspections and Testing for Seismic Resistance and Special Inspections for Wind Requirements. Provisions in Chapter 15 SBC 301 shall apply when not in conflict with the seismic provisions of this chapter.

SECTION 3.2
QUALITY ASSURANCE FOR SEISMIC RESISTANCE

3.2.1 **Scope.** A quality assurance plan for seismic requirements shall be provided in accordance with Section 3.2.2 for the following:

1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C or D.
2. Designated seismic systems in structures assigned to Seismic Design Category D.
3. The following additional systems in structures assigned to Seismic Design Category C:
   a. Heating, ventilating and air-conditioning (HVAC) ductwork containing hazardous materials and anchorage of such ductwork.
   b. Piping systems and mechanical units containing flammable, combustible or highly toxic materials.
   c. Anchorage of electrical equipment used for emergency or standby power systems.
4. The following additional systems in structures assigned to Seismic Design Category D:
   a. Systems required for Seismic Design Category C.
   b. Exterior wall panels and their anchorage.
   c. Suspended ceiling systems and their anchorage.
   d. Access floors and their anchorage.
   e. Steel storage racks and their anchorage, where the factor, *Ip*, determined in Section 12.15, SBC 301, is equal to 1.5.

Exceptions:

A quality assurance plan is not required for structures designed and constructed in accordance with the following:

1. The structure is constructed of light framed cold-formed steel; the design spectral response acceleration at short periods, S_{DS}, as determined in Section 9.4 SBC 301, does not exceed 0.5 g, and the height of the structure does not exceed 10000 mm above grade plane; or

2. The structure is constructed using a reinforced masonry structural system or reinforced concrete structural system; the design spectral response acceleration at short periods, S_{DS}, as determined in section 9.4 SBC 301, does not exceed 0.5 g, and the height of the structure does not exceed 8000 mm above grade plane; or

3. The structure is a detached one- or two-family dwelling not exceeding two stories in height; and

   a. The structure is classified as Occupancy Category I, as determined in Section 9.5, SBC 301; and

   b. The structure does not have any of the following plan or vertical irregularities as defined in Section 10.3.2, SBC 301:

      i. Torsional irregularity.

      ii. Nonparallel systems.

      iii. Stiffness irregularity–extreme soft story and soft story.

      iv. Discontinuity in capacity–weak story.

3.2.2 **Quality assurance plan preparation.** The design of each designated seismic system shall include a quality assurance plan prepared by a registered professional structural engineer. The quality assurance plan shall identify the following:

1. The designated seismic systems and seismic-force-resisting systems that are subject to quality assurance in accordance with Section 3.2.1.
2. The special inspections and testing to be provided as required by Chapter 2 and section 3.4 and other applicable sections of SBC, including the applicable standards referenced by SBC.
3. The type and frequency of testing required.
4. The type and frequency of special inspections required.
5. The required frequency and distribution of testing and special inspection reports.

3.2.3 **Contractor responsibility.** Each contractor responsible for the construction of a seismic-force-resisting system, designated seismic system, or component listed in the quality assurance plan shall submit a written contractor's statement of responsibility to the building official and to the owner prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain the following:

1. Acknowledgment of awareness of the special requirements contained in the quality assurance plan.
2. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official.
3. Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of the reports.
4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

SECTION 3.3
SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

3.3.1 **General.** Special inspection as specified in this section is required for the following, where required in Section 2.1. Special inspections itemized in Section 3.3.2 through 3.3.6 are required for the following:

1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C or D, as determined in Section 9.6, SBC 301.
2. Designated seismic systems in structures assigned to Seismic Design Category D.
3. Architectural, mechanical and electrical components in structures assigned to Seismic Design Category C or D that are required in Section 3.3.5 and 3.3.6.

3.3.2 **Structural steel.** Continuous special inspection for structural welding in accordance with AISC 341.

Exceptions:

1. Single-pass fillet welds not exceeding 8 mm in size.
2. Floor and roof deck welding.

3.3.3 **Cold-formed steel framing.** Periodic special inspections during welding operations of elements of the seismic-force-resisting system. Periodic special inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system, including struts, braces, and hold-downs.

3.3.4 **Storage racks and access floors.** Periodic special inspection during the anchorage of access floors and storage racks 2500 mm or greater in height in structures assigned to Seismic Design Category D.

3.3.5 **Architectural components.** Periodic special inspection during the erection and fastening of exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer in structures assigned to Seismic Design Category D.

Exceptions:

1. Special inspection is not required for architectural components in structures 9000 mm or less in height.
2. Special inspection is not required for cladding and veneer weighing 250 N/m^2 or less.
3. Special inspection is not required for interior nonbearing walls weighing 750 N/m^2 or less.

3.3.6 **Mechanical and electrical components.** Periodic special inspection is required during the anchorage of electrical equipment for emergency or standby power systems in structures assigned to Seismic Design Category C or D. Periodic special inspection is required during installation of piping systems intended to carry flammable, combustible or highly toxic contents and their associated mechanical units in structures assigned to Seismic Design Category C or D. Periodic

special inspection is required during the installation of HVAC ductwork that will contain hazardous materials in structures assigned to Seismic Design Category C or D.

3.3.6.1 **Component inspection.** Special inspection required for the installation of the following components, where the component has a Component Importance Factor of 1.0 or 1.5 in accordance with Section 12.1.5 SBC 301, shall maintain an approved quality control program. Evidence of the quality control program shall be permanently identified on each piece of equipment by a label.

1. Equipment using combustible energy sources.
2. Electrical motors, transformers, switchgear unit substations and motor control centers.
3. Reciprocating and rotating-type machinery.
4. Piping distribution systems 75 mm and larger.
5. Tanks, heat exchangers and pressure vessels.

3.3.6.2 **Component and attachment testing.** The component manufacturer shall test or analyze the component and the component mounting system or anchorage for the design forces in SBC 301 for those components having a Component Importance Factor of 1.0 or 1.5 in accordance with SBC 301. The manufacturer shall submit a certificate of compliance for review and acceptance by the registered design professional responsible for the design, and for approval by the building official. The basis of certification shall be by test on a shaking table, by three-dimensional shock tests, by an analytical method using dynamic characteristics and forces from SBC 301 or by more rigorous analysis. The special inspector shall inspect the component and verify that the label, anchorage or mounting conforms to the certificate of compliance.

SECTION 3.4
STRUCTURAL TESTING FOR SEISMIC RESISTANCE

3.4.1 **Masonry.** Testing and verification of masonry materials and assemblies prior to construction shall comply with the requirements of Section 3.4.1, and Table 3.4.

TABLE 3.4
MINIMUM TESTS AND SUBMITTALS

Certificates of compliance used in masonry construction.
Verification of f'_m prior to construction and every 500 square meters during construction.
Verification of proportions of materials in mortar and grout as delivered to the site.

3.4.2 **Testing for seismic resistance.** The tests specified in Section 3.4.3 through 3.4.5 are required for the following:

1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C or D, as determined in SBC 301.
2. Designated seismic systems in structures assigned to Seismic Design

Category D.

3. Architectural, mechanical and electrical components in structures assigned to Seismic Design Category C or D that are required in Section 3.4.5.

3.4.3 **Reinforcing and prestressing steel.** Certified mill test reports shall be provided for each shipment of reinforcing and prestressing steel used to resist flexural, shear and axial forces in reinforced concrete intermediate frames, special moment frames and boundary elements of special reinforced concrete or reinforced masonry shear walls.

3.4.4 **Structural steel.** The testing shall be as required by AISC 341 and the additional requirements herein. The acceptance criteria for nondestructive testing shall be as required in AWS D1.1 or specified by the registered design professional.

3.4.5 **Mechanical and electrical equipment.** Each manufacturer of designated seismic system components shall test or analyze the component and its mounting system or anchorage and submit a certificate of compliance for review and acceptance by the registered design professional in responsible charge of the design of the designated seismic system and for approval by the building official. The evidence of compliance shall be by actual test on a shake table, by three-dimensional shock tests, by an analytical method using dynamic characteristics and forces, by the use of experience data (i.e., historical data demonstrating acceptable seismic performance) or by more rigorous analysis providing for equivalent safety. The special inspector shall examine the designated seismic system and determine whether the anchorages and label conform with the evidence of compliance.

SECTION 3.5
SPECIAL INSPECTIONS FOR WIND REQUIREMENTS

3.5.0 Inspection of Structural Connections in wind exposure Categories C and D where the 3-second gust basic wind speed is 175 km/h or greater, shall be in accordance to Table 3.5.

Exception: Fabrication of manufactured components and assemblies that have a label indicating compliance with the wind-load and impact-resistance requirements of this code.

TABLE 3.5
REQUIRED VERIFICATION AND INSPECTION OF STRUCTURAL CONNECTIONS

	VERIFICATION AND INSPECTION	Continuous during task listed	Periodic during task listed	References Standard
1.	Roof connections and roof framing connections		X	SBC 306
2.	Wall connections to roof and floor diaphragms and framing.		X	SBC 306
3.	Roof and floor diaphragm systems, including collectors, drag struts and boundary elements.		X	SBC 306
4.	Vertical windforce-resisting systems, including braced frames, moment frames and shear walls.		X	SBC 306
5.	Windforce-resisting system connections to the foundation.		X	SBC 306
6.	Fabrication and installation of components and assemblies required to meet the impact-resistance requirements.		X	SBC 306
7.	Precast concrete wall elements during the erection.		X	SBC 306

CHAPTER 4
SPECIAL CONDITIONS

SECTION 4.1
ALTERNATIVE MATERIALS AND TEST PROCEDURES

4.1.1 **Conformance to standards.** The design strengths and permissible stresses of any structural material that are identified by a manufacturer's designation as to manufacture and grade by mill tests, or the strength and stress grade is otherwise confirmed to the satisfaction of the building official, shall conform to the specifications and methods of design of accepted engineering practice or the approved rules in the absence of applicable standards.

4.1.2 **New materials.** For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests as provided for in Section 4.1.3.

4.1.3 **Test procedure.** In the absence of approved rules or other approved standards, the building official shall make, or cause to be made, the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 1.4. The cost of all tests and other investigations required under the provisions of this code shall be borne by the permit applicant.

SECTION 4.2
TEST SAFE LOAD

4.2.0 Where proposed construction is not capable of being designed by approved engineering analysis, or where proposed construction design method does not comply with the applicable material design standard, the system of construction or the structural unit and the connections shall be subjected to the tests prescribed in Section 4.4. The building official shall accept certified reports of such tests conducted by an approved testing agency, provided that such tests meet the requirements of SBC and approved procedures.

SECTION 4.3
IN-SITU LOAD TESTS

4.3.1 **General.** Whenever there is a reasonable doubt as to the stability or load-bearing capacity of a completed building, structure or portion thereof for the expected loads, an engineering assessment shall be required. The engineering assessment shall involve either a structural analysis or an in-situ load test, or both. The structural analysis shall be based on actual material properties and other as-built conditions that affect stability or load-bearing capacity, and shall be conducted in accordance with the applicable design standard. If the structural assessment determines that the load-bearing capacity is less than that required by the code, load tests shall be conducted in accordance with Section 4.3.2. If the building, structure or portion thereof is found to have inadequate stability or load-bearing capacity for the expected loads, modifications to ensure structural adequacy or the removal of the inadequate construction shall be required.

4.3.2 **Test standards.** Structural components and assemblies shall be tested in accordance with the appropriate material standards listed in SBC. In the absence of a standard that contains an applicable load test procedure, the test procedure shall be developed by a registered design professional and approved. The test procedure shall simulate loads and conditions of application that the completed structure or portion thereof will be subjected to in normal use.

4.3.3 **In-situ load tests.** In-situ load tests shall be conducted in accordance with Section 4.3.3.1 or 4.3.3.2 and shall be supervised by a registered design professional. The test shall simulate the applicable loading conditions specified in SBC 301 as necessary to address the concerns regarding structural stability of the building, structure or portion thereof.

4.3.3.1 **Load test procedure specified.** Where a specialized code or standard listed in SBC contains an applicable load test procedure and acceptance criteria, the test procedure and acceptance criteria in the standard shall apply. In the absence of specific load factors or acceptance criteria, the load factors and acceptance criteria in Section 4.3.3.2 shall apply.

4.3.3.2 **Load test procedure not specified.** In the absence of applicable load test procedures contained within a standard referenced by this code or acceptance criteria for a specific material or method of construction, such existing structure shall be subjected to a test procedure developed by a registered design professional that simulates applicable loading and deformation conditions. For components that are not a part of the seismic-load-resisting system, the test load shall be equal to two times the unfactored design loads. The test load shall be left in place for a period of 24 hours. The structure shall be considered to have successfully met the test requirements where the following criteria are satisfied:

1. Under the design load, the deflection shall not exceed the limitations specified in SBC 301.

2. Within 24 hours after removal of the test load, the structure shall have recovered not less than 75 % of the maximum deflection.

3. During and immediately after the test, the structure shall not show evidence of failure.

SECTION 4.4
PRECONSTRUCTION LOAD TESTS

4.4.1 **General.** In evaluating the physical properties of materials and methods of construction that are not capable of being designed by approved engineering analysis or do not comply with applicable material design standards listed in SBC, the structural adequacy shall be predetermined based on the load test criteria established in Section 4.4.

4.4.2 **Load test procedures specified.** Where specific load test procedures, load factors and acceptance criteria are included in the applicable design standards listed in SBC, such test procedures, load factors and acceptance criteria shall apply. In the absence of specific test procedures, load factors or acceptance criteria, the corresponding provisions in Section 4.4.3 shall apply.

4.4.3 **Load test procedures not specified.** Where load test procedures are not specified in the applicable design standards listed in SBC, the load-bearing and deformation capacity of structural components and assemblies shall be determined on the basis of a test procedure developed by a registered design professional that simulates applicable loading and deformation conditions. For components and assemblies that are not a part of the seismic-load-resisting system, the test shall be as specified in Section 4.4.3.1. Load tests shall simulate the applicable loading conditions specified in SBC 301.

4.4.3.1 **Test procedure.** The test assembly shall be subjected to an increasing superimposed load equal to not less than two times the superimposed design load. The test load shall be left in place for a period of 24 hours. The tested assembly shall be considered to have successfully met the test requirements if the assembly recovers not less than 75 % of the maximum deflection within 24 hours after the removal of the test load. The test assembly shall then be reloaded and subjected to an increasing superimposed load until either structural failure occurs or the superimposed load is equal to two and one-half times the load at which the deflection limitations specified in Section 4.4.3.2 were reached, or the load is equal to two and one-half times the superimposed design load. In the case of structural components and assemblies for which deflection limitations are not specified in Section 4.4.3.2, the test specimen shall be subjected to an increasing superimposed load until structural failure occurs or the load is equal to two and one-half times the desired superimposed design load. The allowable superimposed design load shall be taken as the lesser of:

1. The load at the deflection limitation given in Section 4.4.3.2.
2. The failure load divided by 2.5.
3. The maximum load applied divided by 2.5.

4.4.3.2 **Deflection.** The deflection of structural members under the design load shall not exceed the limitations in SBC 301.

4.4.4 **Wall and partition assemblies.** Load-bearing wall and partition assemblies shall sustain the test load both with and without window framing. The test load shall include all design load components. Wall and partition assemblies shall be tested both with and without door and window framing.

4.4.5 **Test specimens.** Test specimens and construction shall be representative of the materials, workmanship and details normally used in practice. The properties of the materials used to construct the test assembly shall be determined on the basis of tests on samples taken from the load assembly or on representative samples of the materials used to construct the load test assembly. Required tests shall be conducted or witnessed by an approved agency.

REFERENCED STANDARDS

These are the standards referenced within SBC 302. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title. The application of the referenced standards shall be as specified in SBC.

1. American Concrete Institute (ACI), "Specifications for Masonry Structures", ACI 530.1-02, Farmington Hills, MI 483333-9094.

2. American Concrete Institute (ACI), "Specifications for Structural Concrete", ACI 301, Farmington Hills, MI 483333-9094.

3. American Institute of Steel Construction, Inc. (AISC), “Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design, including Supplement No. 1”, 2001, AISC 335-89S1 Chicago, IL 60601-2001.

4. American Institute of Steel Construction, Inc. (AISC), “Load and Resistance Factor Design Specification for Structural Steel Buildings” LRFD 1999, Chicago, IL 60601-2001.

5. American Institute of Steel Construction, Inc. (AISC), “Seismic Provisions for Structural Steel Buildings”, AISC 341-02 Chicago, IL 60601-2001.

6. American Society of Civil Engineers (ASCE/SEI), Structural Engineering Institute, “Specification for Masonry Structures”, ASCE 6-02, Reston, VA 20191-4400.

7. American Society for Testing and Materials (ASTM A 6/A 6M-01b Specification for General Requirements for Rolled Steel, Structural Steel Bars, Plates, Shapes, and Sheet Piling), West Conshohocken, PA 19428-2959.

8. American Society for Testing and Materials (ASTM A 307-00 Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength).

9. American Society for Testing and Materials (ASTM A 568/A 568M—01 Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements).

10. American Society for Testing and Materials (ASTM C 31/31M—98 Practice for Making and Curing Concrete Test Specimens in the Field).

11. American Society for Testing and Materials (ASTM C 172—99 Practice for Sampling Freshly Mixed Concrete).

12. American Society for Testing and Materials (ASTM D 422—98 Test Method for Particle-size Analysis of Soils).

13. American Society for Testing and Materials (ASTM D1143—81 (1994) E01 Test Method for Piles Under Static Axial Compressive Load).

14. American Society for Testing and Materials (ASTM D1557-00 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN m/m^3).

15. American Society for Testing and Materials (ASTM D1586-99 Specification for Penetration Test and Split-barrel Sampling of Soils).

16. American Society for Testing and Materials (ASTM D2487-00 Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

17. American Society for Testing and Materials (ASTM E 605-00 Test Method for Thickness and Density of Sprayed Fire-resistive Material (SFRM) Applied to Structural Members)

18. American Society for Testing and Materials (ASTM E 736—00 Test Method for Cohesion/Adhesion of Sprayed Fire-resistive Materials Applied to Structural Members)

19. American Society for Testing and Materials (ASTM A325M-93 Standard Specification for High-Strength Bolts for Structural Steel Joints)

20. American Society for Testing and Materials (ASTM A490-97 Standard Specification for Heat-Treated Steel Structural Bolts for Structural Steel Joints).

21. American Society for Testing and Materials (ASTM D420 Standard Guide to Site Characterization for Engineering, Design, and Construction Purposes).

22. American Society for Testing and Materials (ASTM D1140 Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75 μm) Sieve).

23. American Society for Testing and Materials (ASTM D4318-05 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils)

24. American Society for Testing and Materials (ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m^3)

25. American Society for Testing and Materials (ASTM D2922-01 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

26. American Society for Testing and Materials (ASTM, (D1194-94 Standard Test Method for Bearing Capacity of Soil for Static Load and Spread Footings).

27. American Society for Testing and Materials (ASTM D2573-01Standard Test Method for Field Vane Shear Test in Cohesive Soil).

28. American Society for Testing and Materials (ASTM D3080-04 Standard Test Method for Direct Shear Test of Soils under Consolidated Drained Conditions).

29. American Society for Testing and Materials (ASTM D3441-05 Standard Test Method for Mechanical Cone Penetration Tests of Soil).

30. American Welding Society (AWS), "Structural Welding Code—Steel", D1.1—00, Miami, FL 33126.

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